(12) UK Patent Application (19) GB (11) 2 307 909 (13) A

(43) Date of A Publication 11.06.1997

(21) Application No 9625426.3

(22) Date of Filing 06.12.1996

(30) Priority Data
(31) 9524916 (32) 06.12.1995 (33) GB

(71) Applicant(s)
Galaxy Fireplace Systems Limited

(Incorporated in the United Kingdom)

8 Unicorn Park, Unicorn Park Place, BRISTOL, BS4 4EX, United Kingdom

(72) Inventor(s)
Anthony Young

(74) Agent and/or Address for Service
Williams,Powell & Associates
34 Tavistock Street, LONDON, WC2E 7PB, United Kingdom

(51) INT CL[6]
C04B 41/86

(52) UK CL (Edition O)
C1M MVK M498 M499
U1S S1971

(56) Documents Cited
GB 2165533 A GB 0969782 A WO 93/13033 A
US 5569427 A US 5194296 A US 4083905 A
Derwent abstract 93-274005/35 & DE004225672A
Derwent abstract 86-173283/27 & JP610106476A
Derwent abstract 85-048066/08 & JP550037440A

(58) Field of Search
UK CL (Edition O) C1M MVC MVJ MVK
INT CL[6] C04B 41/86
ONLINE: WPI

(54) Glazed ceramic fibre materials

(57) The surface of a body of low density ceramic fibre material has a ceramic glaze applied thereto. Before application of the glaze, the surface is consolidated, e.g. by vacuum-forming and/or by the application of a coating of a colloidal silicate binder, which may also partially permeate the ceramic body. The body may constitute part of fireplace surround.

GB 2 307 909 A

CERAMIC MATERIALS

The present invention relates to ceramic materials and more particularly to a method of treating low density ceramic fibre materials.

The present invention seeks to provide an improved ceramic material.

According to the present invention there is provided a method of treating a body of low density ceramic fibre material comprising applying a ceramic glaze to a surface region thereof.

The surface region of the ceramic fibre material is preferably vacuum-formed or otherwise consolidated, before the glaze is applied. The consolidation may alternatively or additionally comprise applying a coating of a colloidal silicate binder, which may also be employed in the previous vacuum forming process. In preferred methods, the coating material also partially permeates the ceramic body.

It is known to apply glaze to conventional high density ceramic materials, such as pottery. However, the person skilled in the art would not expect that a glaze could be applied and fused onto a lightweight ceramic fibre material without deforming the surface thereof. Indeed, experience has shown that if molten glaze is dripped vertically onto some unconsolidated ceramic fibre materials, holes are formed therein.

Ceramic fibre is used almost exclusively for its thermal insulation properties which derive from its low bulk density. The material may be manufactured by blowing an alumino-silicate substance or clay at a high temperature to form fibres, which are then compressed by a vacuum method of ambient temperature, with a binder.

Vacuum forming is a technique commonly used to manufacture rigid, shaped objects which consist primarily of ceramic fibre. The method often involves sucking the fluid (normally water with various deflocculants and binding agents) through a porous surface such as a fine stainless steel mesh upon which the solid constituents of the slurry (ceramic fibre with or without various mineral fillers such as clay) are deposited. A colloidal silicate binder is usually employed in the vacuum forming process and also acts as a hardener.

Once the desired thickness of solids have been built up on the porous surface, the piece is removed from the slurry, and detached from the porous surface. It is then dried, and heated to a temperature suited to the organic and/or inorganic binders used which impart the desired strength to the finished piece.

Many of the applications of vacuum formed ceramic fibre (VFCF) are industrial, particularly in high temperature environments.

A preferred embodiment of the present invention involves coating VFCF with a colloidal silicate hardener/binder and then a ceramic glaze and then firing the piece to a suitable temperature which fuses the glaze, and on cooling both imparts improved strength to the outer surface of the material, and provides an impervious, decorative finish. The colloidal silicate material coating process involves dipping the VFCF article in a tank, or application by hand or spraying. The colloidal silicate material serves to facilitate a high quality glaze; it is believed that this is achieved by virtue of a reaction between the colloidal silicate and ceramic glaze layers. A wide range of ceramic glazes may be employed, preferably with a firing temperature in the range 900°C to 1300°C and most preferably approximately 1000°C.

As outlined above, ceramic glaze is normally only applied to dense materials - it is completely unexpected that a glaze could be fused onto a lightweight, ceramic

fibre - containing body without fusing the body and deforming its surface. Glaze often drips off dense pieces being fired in our kilns onto unconsolidated ceramic fibre lining the hearth (bottom) of the kiln, and the drips form a hole in the fibre.

Glaze reacts with the body it is applied to on firing, forming a boundary layer containing dissolved or reacted body components which normally have a higher melting point than the glaze. At the firing temperature used the boundary layer becomes sufficiently viscous to slow down further reaction between the glaze and the body, and when the kiln temperature is reduced and the object being fired cools down, the boundary layer, and the glaze solidify.

If a surface of a body consists of a very open structure, with a large proportion of voids, for the glaze to dissolve enough body material to form a stable boundary layer, a substantial volume of the body will be consumed, leading to visible deformation of the outer skin of the body.

This embodiment of the present invention relies on the consolidation of the ceramic fibre at least superficially by, for example, vacuum forming and/or the use of fillers and/or binders to provide a surface sufficiently resistant to the dissolution of the fibre by the molten glaze for a good undistorted glaze surface to be formed.

So-called "engobes" may be used, which assist the bonding of the glaze material and the base ceramic material.

Materials according to the present invention are preferably used in fireplace surrounds, but can also be used in any situation in which a ceramic product needs to be glazed.

CLAIMS

1. A method of treating a body of low density ceramic fibre material comprising applying a ceramic glaze to a surface region thereof.

2. A method according to claim 1, wherein the surface region is consolidated before the glaze is applied.

3. A method according to claim 2, wherein the consolidation comprises vacuum-forming.

4. A method according to claim 2 or 3, wherein the consolidation comprises applying a coating of a colloidal silicate binder.

5. A method according to claims 3 and 4, wherein the binder is also employed in the vacuum-forming process.

6. A method of treatment substantially as herein described.

7. A ceramic product manufactured in accordance with the method of any preceding claim.

8. A product according to claim 7 which constitutes at least part of a fireplace surround.

9. A ceramic material substantially as herein described.

The Patent Office

5

Application No: GB 9625426.3 **Examiner:** C.A.Clarke
Claims searched: 1-9 **Date of search:** 24 February 1997

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.O): C1M(MVC,MVJ,MVK)

Int Cl (Ed.6): C04B 41/86

Other: ONLINE: WPI

Documents considered to be relevant:

Category	Identity of document and relevant passage		Relevant to claims
X	GB 2165533 A	CORRY see whole document	1 to 7
X	GB 0969782	OWENS CORNING FIBREGLAS see claim 1	1 ,2 and 7 at least
X	WO 93/13033 A	SOCIETE EUROPEENNE DE PROPULSION see abstract	1,2 and 7 at least
X	US 5569427	SEMENOVA see claim 1	1,2 and 7 at least
X	US 5194296	HAMMER see claim 4	1,2 and 7 at least
X	US 4083905	INSLEY see claims 2-5	1,2 and 7 at least
X	Derwent Abstract 93-274005/35 & DE04225672A BAYERISCHE MOTOREN WERKE		1,2 and 7 at least
X	Derwent Abstract 86-173283/27 & JP610106476A MATSUSHITA ELECTRIC		1,2 and 7 at least
X	Derwent Abstract 85-048066/08 & JP550037440A TOMOEGAWA PAPER		1,2 and 7 at least

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

PUB-NO: GB002307909A

DOCUMENT-IDENTIFIER: GB 2307909 A

TITLE: Glazed ceramic fibre materials

PUBN-DATE: June 11, 1997

INVENTOR-INFORMATION:

NAME	COUNTRY
YOUNG, ANTHONY	N/A

ASSIGNEE-INFORMATION:

NAME	COUNTRY
GALAXY FIREPLACE SYSTEMS LTD	GB

APPL-NO: GB09625426

APPL-DATE: December 6, 1996

PRIORITY-DATA: CA02207477A (June 10, 1997) , GB09524916A (December 6, 1995)

INT-CL (IPC): C04B041/86

EUR-CL (EPC): C04B041/50 ; C04B041/52, **F24B001/198**